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"The use of languages such as that described in this book makes it possible for people to do large-scale programs on such computers after only hours of training..."—Harry D. Huskey

By MAURICE H. HALSTEAD

MACHINE - INDEPENDENT COMPUTER PROGRAMMING

This text is based upon the lecture notes developed by the author while teaching a course at the University of California described as "Neliac, a dialect of Algol." This course was taught twice, in each case to a group which was extremely heterogeneous, including both experienced programmers and others who were completely unfamiliar in computers. Further, the interest of the students varied widely from individual to individual, including business, engineering, mathematics, and real-time control. In an effort to interest and challenge all groups simultaneously, a basic self-compiler written for the purpose was used as the principal sample. This compiler (covered in chapters 5 through 10), served as neutral material from which the novices in various fields could develop proficiency in both the language and in the type of thinking required in handling compilers, while at the same time it provided the devotees with the necessary background from which they themselves soon started suggesting efficient routines and improved techniques in the writing of compilers. Consequently, this book is therefore designed to teach the student how to write to computers in the Neliac language and then to teach him how to teach the computer how to read Neliac, if it does not already know.

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By MAURICE H. HALSTEAD

with an introduction by
Harry D. Huskey

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From the introduction ...

"The aim in developing a language for specifying computational processes or algorithms has been not so much to consign the execution of these computations to a workman as it has been to make the use of automatic computers more easily accessible to scientists and engineers without an elaborate training program. Thus the use of languages such as that described in this book makes it possible for people to do large-scale problems on such computers after only hours of training instead of months or years."

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This work was originally published in a limited quantity as a technical report for distribution by the Information Systems Branch of the Office of Naval Research and Cornell Aeronautical Laboratory, Inc. In response to an overwhelming demand, Spartan Books has re-published this technical report without any modifications. Dr. Rosenblatt sets forth the principals, motivations, and accomplishments of Perception Theory in their entirety. It will also serve as a self-sufficient text for all scientists interested in a serious study of Neurodynamics. Appendices are included to serve as an aid for cross-referencing equations, definitions, and experimental designs which are described in the various chapters.

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AERONAUTICS and SPACE TECHNOLOGY

VON KÁRMÁN et al.

INTERNATIONAL COUNCIL OF THE AERONAUTICAL SCIENCES, Third Congress, Stockholm, 1962

Proceedings of the Third Congress of the International Council of the Aeronautical Sciences held at Stockholm August 27-31, 1962, presided over by the late DR. THEODORE VON KARMAN, *Honorary President of ICAS*. 1,472 pages, 6 x 9, illus. 1964. \$48.00
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BREGMAN

SURFACE EFFECTS IN DETECTION

Sponsored by IIT Research Institute, Chicago, Illinois. Edited by J. I. BREGMAN, *Illinois Institute of Technology Research Institute* 6 x 9, illus. (ready December, 1964)

A collection of outstanding papers presented at the Conference on Surface Effects in Detection June 29–July 1, 1964, at the Brookings Institution in Washington, D.C. Techniques of detecting, collecting, measuring and studying of surface contaminants, pollutants, acid monomolecular films, adsorbed gases, and semiconductor electrical properties are described and illustrated. In the case of contaminants, the problems are shown to depend on many factors, including the characteristics of the contaminant itself, the nature of the gas carrying the contaminant, the surface on which it is absorbed, the mechanism by which the surface change is detected, and the time variation with which changes of contaminant concentration is to be recognized. The book also describes the Electro-Odocell, an instrument for detecting and measuring the change in surface potential by molecules given off by odorants.

CONTENTS: Fundamental Factors in Detecting Chemicals as Adsorbed Films, by W. A. Zisman. Problems in Use of Surface Phenomena in Detection of Contaminants, by J. R. Eaton. Experiments on the Specificities of Human Olfaction, by J. W. Johnston, Jr. Changes in Surface Potentials of Metal Caused by Adsorbed Monolayers, by W. A. Zisman et al. The Electro-Odocell, by N. Tanyolac and G. Yeldis. Contact Potentials in Detection of Airborne Vapors, by A. Dravnieks. Studies of Surface Ionization Energies, by P. L. Kronick. Surface Conductivity of Solid Conductors, by E. S. Snavely, Jr., et al. Detection of Chemical Species by Surface Effects on Metals and Semiconductors, by T. M. Buck and F. G. Allen. P- and N-Type Conduction in Organic Solids, by E. O. Forster and F. Gutmann. Effect of Gases on the Conductivity of Organic Crystals, by M. M. Labes. Mass Spectrographic Methods for Studying Surfaces and

Reactions at Surfaces, by W. M. Hickam and Y. L. Sandler. Techniques for Studying Low-Level Adsorption, by P. J. Reucroft. The Design and Performance of a Piezoelectric Sorption Hygrometer, by H. M. Crawford et al. Optical Examination of Monomolecular Films, by H. P. Gregor and J. Bagg. Characterization of High Polymers by Adsorption Indicators, by Carroll Benjamin. Limitations in Collection Efficiency of Air Pollutants, by R. J. Fallon. Sensitivity Limitations in Detection of Airborne Vapors by Surface-related Effects, by A. Dravnieks. Potential Biological and Biochemical Systems for the Detection of CW Agents, by L. H. Goodson and E. K. Bauman. Molecular Structure of Phosphates and Phosphonates and their Specific Binding Tendency, by T. Higuchi. Surface Effects in Limits of Visual Detection of Chromophoric Systems, by R. H. Poirer et al.

KRAUS

EXTENDED SURFACES

By ALLAN D. KRAUS, *Principal Staff Engineer, Honeywell Aeronautical Division, St. Petersburg, Florida*. 288 pages, 6 x 9, illus. (1964)..... \$13.00

Presents the first detailed treatment of this important area of heat transfer, with full mathematical development of temperature excess profiles, heat flow, and efficiency in extended-surface fins and spines. In addition, the author has included detailed information on the design of extended surfaces, their optimum shapes and range of application, an account of original work in cooling miniaturized electronic equipment; a review of Bessel, gamma, and hyperbolic functions and related mathematical data. An important feature of the book is the extensive tables which permit the reader to obtain accurate values of the Bessel and gamma functions required in extended-surface analysis.

CONTENTS (abridged): The Longitudinal Fin of Rectangular Profile: Nomenclature. Differential Equations for the Temperature Pattern. Temperature Excess Patterns and Heat Flow through Base. The Radial Fin of Rectangular Profile: Temperature Excess Patterns and Heat Flow through Base. Efficiency. Temperature Excess and Heat Flow by Graphical Methods. Longitudinal Fins of Triangular and Trapezoidal Profile: Nomenclature. General Differential Equation for All Profiles. Longitudinal Fin of Triangular Profile. Longitudinal Fin of Trapezoidal Profile. Longitudinal Fins of Parabolic

Profile: Governing Differential Equations and Temperature Excess. Heat Flow through Base. Efficiency. Optimum Shapes and Design of Longitudinal Fins: Longitudinal Fin of Rectangular Profile. Optimum Dimensions. Longitudinal Fin of Triangular Profile. Radial Fins of Hyperbolic Profile and Least Material: Radial Fins—Generalized Differential Equation. Temperature Excess. Heat Flow through Base. Spines: General Differential Equation for Temperature Excess. Spines of Constant Cross-sectional Heat-flow Area.

LIPPINCOTT-MARGOSHES

**10TH COLLOQUIUM SPECTROSCOPICUM INTERNATIONALE
(Proceedings)**

Edited by ELLIS R. LIPPINCOTT, *University of Maryland*, and MARVIN MARGOSHES, *National Bureau of Standards*. 806 pages, 6 x 9, illus. \$25.00

This comprehensive, authoritative summary of recent advances in the field of spectroscopy presents 45 of the 170 papers presented at the Colloquium, held June 18–22, 1962, at the University of Maryland, under the sponsorship of the University's Department of Chemistry, and of the International Union of Pure and Applied Chemistry, with over 800 participants representing 29 countries registered for the five-day conference. The papers, which are heavily illustrated in line and halftones and contain extensive bibliographies not available elsewhere, cover a broad range of spectroscopic applications from astrophysics and crystal structure to electron probe microanalysis and ruby laser studies in Raman spectrophotometry. A detailed index makes the book especially valuable as a reference work.

CONTENTS (abridged): The Role of Spectroscopy in Astrophysics. Present Status of Our Knowledge of Atomic Transition Probabilities. Isotopic Shifts in the Spectra of Dysprosium and Samarium. Atomic Absorption Spectroscopy. Excitation and Related Phenomena in Flames. Extreme Ultraviolet Spectroscopy. X-Ray Emission Spectra and Chemical Bond. Scanning Techniques in Electron Probe Microanalysis, with Some Applications in Mineralogy and Biology. Spectroscopic Studies with the Ruby Optical Maser. Emission Mode Patterns of Ruby Lasers. The Origin of Group Frequency Shifts. The Donor Characteristics of the Carbonyl Group

III. Some High-resolution Studies in the Infrared. Recording the Infrared Spectra of Gas-chromatography Fractions. Optical Spectra of Gaseous Free Radicals. Total Luminescence of Organic Molecules of Petrochemical Interest. Chemical Applications of Nuclear Magnetic Resonance. Spin Density Distributions in Conjugated Molecules by NMR Contact Shifts. Unsteady Modes of the Spin Generator. Application of Electron Magnetic Resonance Techniques to the Study of the Phosphorescence of Organic Molecules. High-resolution Electron Spin Resonance. Correlation of Mass Spectra with Molecular Structure.

MELLAN

POLYHYDRIC ALCOHOLS

By IBERT MELLAN, *Director of Research, Polychrome Corporation*. 208 pages. 6 x 9, illus. (1962) \$7.50

The polyhydric alcohols have only recently come to occupy a prominent place among industrial alcohols solvents and chemicals. Until about fifty years ago, glycerol, the only major type, supplied the limited demand for such products. Today polyhydric alcohols have acquired such importance that they are regarded as an index of development in the textile, alkyd resin, lacquer, and automotive industries, and are essential in the preparation of alkyd resins, new synthetic fibers, synthetic rubber, and many other materials. This authoritative book gives the characteristics, nomenclature, physical characteristics, structure, and production data on polyhydric, dihydric, and trihydric alcohols, as well as other solvents like erythritol, arabitol, pentaerythritol, sorbitol, and hydrates of polyhydric alcohols.

CONTENTS (abridged): Glycols. Ethylene glycol. Propylene Glycol. 1,3-propanediol. Butanediols. 1,3-Butylene glycol. 1,2-Butanediol. 2,3-Butanediol. 1,4-Butanediol. 2-Butyne-1,4-diol. 1,5-Pentanediol. 2,2-Dimethyl-1,3-propanediol. 2,4-Pentanediol. 2,5-Hexanediol. 1,6-Hexanediol. 2-Methyl-2,4-Pentanediol. Pinacol. 2,2-Diethyl-1,3-propanediol. 2-Ethyl-1,3-hexanediol. 2,5-

Dimethyl-3-hexyne-2,5-diol. *p*-Xylene glycol. "Kromfax" solvent. 2-Ethyl-2-butyl, 1,3-propanediol. 2,2,4-Trimethyl-1,3-pentanediol. Trihydric alcohols. Glycerol. 1,2,4-Butanetriol. 1,2,6-Hexanetriol. Trimethylolpropane. Other Polyhydric Alcohols. Erythritol and Arabitol. Pentaerythritol. Sorbitol. Hydrates of Polyhydric Alcohols. References.

COMPUTER SCIENCE and TECHNOLOGY

AFIPS

AMERICAN FEDERATION OF INFORMATION PROCESSING SOCIETIES CONFERENCE PROCEEDINGS

Joint Computer Conference Proceedings. Vol. 22: 314 pages, 8½ x 11, illus., \$8.00; Vol. 23, 415 pages, 8½ x 11, illus., \$10.00; Vol. 24, 647 pages, 8½ x 11, illus., \$16.50; Vol. 25, 629 pages, 8½ x 11, illus., \$16.50; 50% discount off list price to AFIPS, ACM, and IEEE Members.

These large, double-column, 8½ x 11-in. information-crammed volumes—published by Spartan twice each year immediately prior to the Spring and Fall Joint Computer Conferences—provide a permanent record and reference work of the Technical Program sponsored by the American Federation of Information Processing Societies. The large number of papers in each volume, all written by experts in their respective fields, encompass a broad cross section of computer science and technology, including computer hardware, software, multipoint operating complexes, theory and implementation of cooperative systems, hybrid systems, compilers, information retrieval, and social implications of computer technology.

VOL. 22: FALL 1962 JOINT COMPUTER CONFERENCE

CONTENTS (abridged): Processing Satellite Weather Data. Design of a Photo Interpretation Automaton. Experience with Hybrid Computation. Data Handling at an AMR Tracking Station. Information Processing for Interplanetary Exploration. The Solomon Computer. The KDF9 Computer System. A Common Language for Hardware, Software, and Applications. Intercommunication Cells, Basis for a Distributed Logic Computer. On the Use of the Solomon Parallel-Processing Computer. Data Processing for Communication Network Monitoring and Control. Design of ITT 525 "Vade" Real-time

Processor. On the Reduction of Turnaround Time. Remote Operation of a Computer by High-speed Data Link. Standardization in Computers and Information Processing. High-speed Ferrite Memories. Microaperture High-speed Ferrite Memory. Magnetic Films—Revolution in Computer Memories. The Case for Crytronics? Some Experiments in the Generation of Word and Document Associations. A Logic Design Transistor. Cluster Formations and Diagnostic Significance in Psychiatric Symptom Evaluation.

VOL. 23: SPRING 1963 JOINT COMPUTER CONFERENCE

CONTENTS (abridged): Algorithms in Business Data Processing. Equitable Distribution. RAMPS—A Technique for Resource Allocation and Multi-project Scheduling. Machine Organization I. Time Sharing on the Ferranti-Packard FP6000 Computer System. Experience with the Atlas Scheduling System. Analog and Hybrid Systems I. DYSAC: A Digitally Simulated Analog Computer. Six-Degree-of-Freedom Simulation of a Manned Orbital Docking System. Application of Hybrid Analog and Digital Techniques in the Automatic Map

Compilation System. Data Acquisition Transmission and Display. Automatic Reading Machine for Telegraph Service. A Research Laboratory for Processing and Displaying Satellite Data in Real Time. Ground Operation Equipment for the Orbiting Astronomical Observatory. Error Detection Correction and Control. Critical Analysis of the Current State of the Art. Analog and Hybrid Systems II. Automatic Parameter Optimization as Applied to Transducer Design. Computer Controlled Printing. Manned Spacecraft Simulation.

VOL. 24: FALL 1963 JOINT COMPUTER CONFERENCE

CONTENTS (abridged): Programming—Experimental. Simulation of an Assembly of Simplified Nerve Cell Models on a Digital Computer. Cyclops I: A Second-Generation Recognition System. Simulation of a Turing Machine on a Digital Computer. Computer Memories. The Rope Memory. A 300-Nanosecond Search Memory. A New Technique for Using Thin Magnetic Films as a Phase Script Memory Element. Laminated Ferrite Memory. Large-capacity Cryoelectric Memory with Cavity Sensing. Multiprocessor Computer Systems.

Generalized Multiprocessing and Multiprogramming Systems. Probabilistic Analysis of Computing-load Assignment in a Multiprocessor Computer System. Information Retrieval: A Discriminating Method for Automatically Classifying Documents. The Direct-access Search System. A Flexible Direct File Approach to Information. Computer Organization. Hybrid Analog-Digital Computation. Mass Storage Memories. Natural Language Processing. Real-time Simulation.

VOL. 25: SPRING 1964 JOINT COMPUTER CONFERENCE

CONTENTS (abridged): Compilers—Tutorial. Programming Systems and Languages: A Historical Survey. Syntax-Directed Compiling. General-Purpose Table-driven Compiler. Computer Technique for Producing Animated Movies. Simulation of Biological Cells by Systems. Real-time Computer Studies of Bargaining Behavior. Social Implications of Data Processing. An Ethos for the Age of Cyberculture. The Computer Revolution and the Spirit of Man. Numerical Analysis. New Difference Equation Technique for Solving Non-linear Differential Equations. Command and Control.

Fractionization of the Military Context. Some Problems Associated with Large Programming Efforts. Hybrid Systems. A Hybrid-Analog-Digital Parameter Optimizer for Astrac II. A 2MC Bit-Rate Delta-Sigma Modulation System for Analog Function Storage. Artificial Intelligence. Multiprogramming. Remote Computing. Logic Layout and Associative Memories. On the Analysis and Synthesis of Three-valued Digital Systems. An Algorithm for Placement of Interconnected Elements Based on Minimum Wire Length. Information Retrieval. Business Data Processing.

BARNUM-KNAPP

PROCEEDINGS OF THE 1962 WORKSHOP ON COMPUTER ORGANIZATION

Edited by ALAN A. BARNUM and MORRIS A. KNAPP. 256 pages, 6 x 9, illus. (1963)..... \$9.00

This significant new publication comprises the eight papers presented at the Workshop on Computer Organization held on October 2-3, 1962, at the Westinghouse Air Arm Division in Baltimore, sponsored by the United States Air Force Rome Air Development Center and Westinghouse Electric Corporation. The purpose of the workshop was to present the major computer organizational concepts under development, so as to equip technical workers as well as management personnel—whether government or business—to understand and to work with the new hardware and techniques in computer technology. Emphasis is placed on new lines of special-purpose, programmable computing devices for military and business applications.

CONTENTS: Countable-bit Nomographic Electronic Computation, by Douglas P. Adams. The Multi-list Central Processor, by N. S. Prywes and S. Litwin. The SOLOMON Computer—Preliminary Report, by D. L. Slotnick et al. A Two-dimensional Iterative Network Computing Technique and Mechanizations, by J. K.

Hawkins and C. J. Munsey. Highly Parallel Machines, by Webb T. Comfort. Iterative Circuit Computers, by Harvey L. Garner and Jon S. Squire. The UCLA Variable Structure Computer System, by Gerald Estrin et al. Function-oriented On-line Analysis, by Glen J. Culler.

GUTTERMAN-HOLLITCH

COMPUTER APPLICATIONS—1962

Edited by MILTON M. GUTTERMAN and ROBERT S. HOLLITCH, *Illinois Institute of Technology Research Institute*. 224 pages, 6 x 9, illus. (1964)..... \$7.00

The Illinois Institute of Technology Research Institute sponsors an annual two-day symposium devoted to the application of digital computers to business, management, science, and engineering. The 1962 symposium, ninth in the series, assembled leading members of the computing field from universities, the government, and industry to discuss their experiences and views. This volume presents all of the papers presented and includes many of the subsequent panel discussions and questions from the audience.

CONTENTS: Real-time Control of Traffic Flow, by Leslie C. Edie. Automatic Scanning of Cardiovascular Disease Utilizing FOSDIC, by John Cosma and Hubert V. Pipberger. Midwest Stock Exchange—Centralized Accounting System, by Albert B. Goldstein. Computers and the Law, by Reed C. Lawlor. Electronic Processing of Taxpayer Returns, by Douglas L. Barnes. Factored Cost Applied to Maintenance Material and Job Cost Control, by Jack P. Kornfeld. Computers in Technical Information Systems, by E. M. McCormick. Hybrid

Computation in Space Flight, by Gerald E. Reich. Particle-in-Cell Fluid Dynamics on the IBM Stretch, by Thomas D. Butler. The Value of Linear Programming to the Petroleum Industry, by Gordon C. McKeague. Data-processing Standards, by Richard F. Clippinger. Aspects of Current Research in Automatic Language Analysis, by Warren J. Plath. On-line Computer Optimization of a Chemical Process, by Victor S. Morello et al. An International Movement in Programming Languages, by Robert W. Bemer.

HALSTEAD

MACHINE-INDEPENDENT COMPUTER PROGRAMMING

By MAURICE H. HALSTEAD, PH.D., *Naval Electronics Laboratory*. 288 pages, 6 x 9, illus. (1962)..... \$6.50

Not just another book on programming of computers, but the first clear account of how the fastest, most powerful "high-level languages" works; how they are used, and how the reader can create them for his own computer system. The text is based on the lecture notes developed while teaching a course, described as "Neliac, a Dialect of Algol," for the University of California. In an effort to interest and challenge both experienced programmers and others who were completely unfamiliar with computers, a basic self-compiler written for the purpose was used as the principal example. This compiler, which is covered extensively in the book, served as neutral material from which the novices in various fields could develop proficiency in both the language and in the type of thinking required in handling computers. Thus the book is designed to teach the student how to "write to" computers in the Neliac language and then to teach him how, in turn, to "teach" a computer to read Neliac if it does not already "know."

CONTENTS: Introduction. How to Read Neliac or Algol; Publication Algol. How to Write in the Language: Input-output, Program Testing or Debugging. Basic Concepts of Self-compilers. Load Programs. Processing

Noun Lists. Co-No Tables. Generators. Compiling Compilers and Compiler Systems. Input-output. Decompiling with D-Neliac. Appendix: Neliac C. Neliac 704. Neliac 1604. D-Neliac C.

WILCOX-MANN

REDUNDANCY TECHNIQUES FOR COMPUTING SYSTEMS

Edited by RICHARD H. WILCOX, *Head, Information Systems Branch, Office of Naval Research*, and WILLIAM C. MANN, *Electronic Division, Westinghouse Electric Corporation*. 403 pages, 6 x 9, illus. (1962)..... \$10.00

Much of the present interest in redundancy techniques arises from the fact that computer equipment and systems are disabled by almost any internal failure, and increases in complexity only make failures more probable, so that failure cost may outweigh the utility of a working system. While stocking of spare parts—a time-honored redundancy technique—serves some purpose, it involves a prohibitive amount of down time. Operating equivalent components or subsystems simultaneously and in parallel, or the use of circuit equivalents of error-correcting codes used in communication systems, are two more positive methods. This book discusses all types of redundancy techniques, comparing and detailing the potentials and limitations of the various systems.

CONTENTS: Redundancy—A Misleading Misnomer. Transients in Combination Logic Circuits. The Reliability of Coherent Systems. The Utility of Anastomotic Nets. Tolerable Errors of Neurons for Infalible Nets. Theoretical Considerations on Reliability Properties of Recursive Triangular Switching Networks. Codes and Coding Circuitry for Automatic Error Correction within Digital Systems. On the Nature of the Reliability of Automata. Quadded Logic. Adaptive Vote-takers Improve the Use of Redundancy. Analysis and Synthesis Methods for Redundant Logical Design. Restorative Processes for Redundant Computing Systems. Redun-

dant Digital Systems. System Redundancy and Information Theory. Mean Life of Parallel Electronic Components. The Reliability of Items in Sequence with Sensing and Switching. The Design of Digital Circuits to Eliminate Catastrophic Failures. Statistical Theory of Improving the Reliability of Digital Computers with Redundancy. A Commentary on Redundancy. Minimally Redundant Reliable Computing Systems Design. Redundancy Improves Computer Reliability. Two Approaches to Incorporating Redundancy into Logical Design.

ADI

**AMERICAN DOCUMENTATION INSTITUTE—PARAMETERS OF
INFORMATION SCIENCE** (see page 13)

AFIPS

JOINT COMPUTER CONFERENCES (see page 9)

BARNES-KNAPP

**PROCEEDINGS OF 1962 WORKSHOP ON COMPUTER
ORGANIZATION** (see page 10)

CIFS

**INFORMATION SYSTEM SCIENCES: PROCEEDINGS OF THE
SECOND CONGRESS**

Edited by EDWARD M. BENNETT, JOSEPH SPIEGEL, and DONALD E. WALKER,
Information Sciences Department, the MITRE Corporation. 6 x 9, illus. (ready
December, 1964)

Sponsored by the Electronics Systems Division of the U. S. Air Force Systems Command and the MITRE Corporation, the Second Congress of the Information System Sciences, held November, 1964, encompassed a wide range of subject matter in this fast-developing science-technology field, including information system design techniques, information requirements and the use of R&D planning, information system analysis, tactical information systems, organization for the design of information systems, and many other related topics. This volume presents all of the papers of the Second Congress, complete with line and halftone illustrations.

CONTENTS (abridged): Criteria of Efficiency of Retrieval Processes. Large-scale Information System Design. An Information Center for Research and Development Management. The Use of Information Technology in Research and Development Planning. Information Requirements for Organizational and Budgetary Controls in Research and Development. The Evaluation

of Performance of Large Information Systems. Introduction to Tactical Information Systems. A Technical Progress Report on the Army CCIS-70 Project. Design Considerations for a Model of Tactical Operations. The Role of Information Technology in Strategic Planning. Information Requirements for Development Decisions.

COINS

COMPUTER AND INFORMATION SCIENCES (see page 19)

ADI

**PROCEEDINGS OF AMERICAN DOCUMENTATION
INSTITUTE—Parameters in Information Science**

6 x 9, illus. (ready October, 1964)

In addition to the intrinsic merits of this book as a source and reference book in the information sciences, it is particularly valuable as a document and as a publisher's "first" in that it was set in type, printed, and bound in advance of the Annual Meeting of the American Documentation Institute in Philadelphia, Pa., on October 5-8, 1964, so that each member and each guest attending the four-day session had a bound copy of the Proceedings of the ADI available before the papers themselves were presented. It is thus particularly timely and up-to-date, and a "must" for every worker in this fast-moving field.

CONTENTS (abridged): Information in Decision Procedures. Educational and Professional Aspects of Information Science. Information and Data Centers, Services, and Networks. Information Storage and Retrieval. Memory Organization and Operation. Media

and Methods of Document Storage, Search, and Display. Utilization of Information—Behavioral, Psychological, and Sociological Aspects. Analysis, Indexing, and Correlation of Information. Symbolization, Transformation, and Translation of Information.

ELIAS

TECHNICAL INFORMATION CENTER ADMINISTRATION

Edited by A. W. ELIAS, *Institute for Scientific Information*. 6 x 9, illus. (ready October, 1964)

Presents the complete text of papers delivered at the Conference on Technical Information Center Administration on June 15-17, 1964, at Drexel Institute of Technology, Philadelphia, Pa. The conference was sponsored by the Graduate School of Library Science, Department of Information Science. The tremendous increase in technological specialization has made it increasingly difficult, if not impossible, for any single individual to read, or even know of, all information pertinent to his particular field. Because of this, information service organizations are being formed at an increasing rate. How to control and utilize the information thus abstracted is one of the many topics covered in this book, together with computer management programs and "operating system" of the equipment.

CONTENTS (abridged): Abstracting Control, by G. L. Brodsky. Computer Management in Information Centers, by B. F. Cheydleur. Sources and Material Selection, by R. D. Davis. Macrocoding Devices for Document Management, by M. C. Kolb. The Goals of Information Center Administration, by W. K. Lowry. Controlling Costs in Technical Information Centers, by A. Peters.

Designing a Technical Information Center, by H. Skolnik. Indexing Control in the Technical Information Center, by E. Wall. Internal Publication, by B. H. Weil. User Requirements and Public Relations, by I. D. Welt. Personnel Selection and In-House Training for Technical Information Centers, by F. R. Whaley.

INFORMATION PROCESSING

FISCHER-POLLOCK-RADDACK-STEVENS

OPTICAL CHARACTER RECOGNITION

Edited by GEORGE L. FISCHER, JR., *Farrington Electronics, Inc.*, DONALD K. POLLOCK, *Office of Naval Research*, BERNARD RADDACK, *Department of the Navy*, and MARY ELIZABETH STEVENS, *National Bureau of Standards*. 412 pages, 6 x 9, illus. (1962)..... \$10.00

This valuable survey and reference work contains the proceedings of a Symposium on Optical Character Recognition held in Washington, D.C., January 15-17, 1962, under the joint sponsorship of the Office of Naval Research and the Research Information Center of the National Bureau of Standards. The principal objective was to bring together specialists, scientists, and potential users interested in exploiting automatic character recognition techniques for a wide variety of applications. The book described available and operational equipment, certain directions of current research, and a forecast of future developments.

CONTENTS: The RCA Multi-font Reading Machine, by W. T. Hannan. Some Elements of Optical Scanning, by G. L. Fischer and C. C. Heasley. Developments in Character Recognition Machines at Rabinow Engineering Company, by J. Rabinow. Character Recognition Techniques for Address Reading, by J. B. Chatten and C. F. Teacher. Reading Russian Scientific Literature, by J. A. Fitzmaurice. An Evaluation of Vidicon Scanning Techniques Coupled with Area Analysis Recognition, by P. Barth. A Typed Page Reader for Elite Type, by Leon Mintz. Wide Tolerance Optical Character Recognition for Existing Printing Mechanisms, by R. K. Gerlach. Design Consideration for A Stylized Font Character Reader, by W. T. Booth, G. M. Miller, and O. A. Schleich. Some Important Factors in the Practical Utilization of Optical Character Readers, by E. C. Greanias. Character Recognition as Signal Detection in Noise, by A. B. Novikoff. Automatic Reading of Cursive

Script, by L. D. Harmon. Digital Pattern Recognition, by Moments, by F. L. Alt. Analytic Approximation and Invariance in Character Recognition, by R. F. Meyers, V. E. Giuliano, and P. E. Jones. Weighted Area Scanning Techniques for Character Recognition, by D. M. Baumann. Recent Developments in Optical Character Recognition at M.I.T., by L. G. Roberts. Recognition of Mixed Font, Imperfect Alpha-numeric Characters, by W. S. Holmes, H. R. Leland, and J. L. Muerle. A Scheme for Recognizing Patterns From an Unspecified Class, by C. Barus. Linear Decision Functions with Application to Pattern Recognition, by W. H. Highleyman. Multi-font Print Recognition, by M. C. Andrews. Use of Autocorrelation for Character Recognition, by M. B. Clowes. The Search to Recognize, by L. Uhr and C. Vossler. Users Requirements—Panel Discussion. Horizons—Panel Discussion.

GUTTERMAN-HOLLITCH

COMPUTER APPLICATIONS-1962 (see page 10)

HALSTEAD

MACHINE-INDEPENDENT COMPUTER PROGRAMMING

(see page 11)

MILTON

STEPS TO BETTER WRITING

By HILARY H. MILTON, *Deputy Director, Reports Staff, National Aeronautics and Space Administration*. 98 pages, 6 x 9 (1962).... \$3.95

This book deals with a kind of information processing that most of us tend to grow careless about—the communication of ideas and decisions through the medium of the written word. It is designed to help business writers, technical writers, government writers, industrial writers, and college students to create more meaningful manuscripts—and thus stay abreast of research and development, production programs, and administrative work in business and government.

CONTENTS (abridged): Steps to Better Report Writing. Gathering Data for the Report. Aligning Visual Aids. Writing the Introduction. Putting Words to the Analysis. Recommending Action. Steps to Better Organizing and Outlining. Purpose and Scope of Writing. Specific Working Title. Step-by-Step Method. Purpose/Reader Method. Arrange Topics

According to Method of Approach. Steps to Better Continuity. Introduce Reader to Subject. Develop Continuity by Specific Means. Plan for Continuity in Your Writing. Steps to an Effective Writing Style. Writing Effective Sentences. Steps to Better Use of Illustrations. Steps to Better Editing.

HAYES et al.

INFORMATION SYSTEMS WORKSHOP

By R. M. HAYES, *Advanced Information Systems, Inc.*, and others; a Conference Sponsored by the American Documentation Institute and the University of California at Los Angeles. 153 pages, 6 x 9, illus. (1962)..... \$6.00

Subtitled "The Designer's Responsibility and His Methodology," this volume contains the papers presented at the 1962 Lake Arrowhead Conference of the American Documentation Institute and the University of California (Los Angeles), supported by the National Science Foundation and the National Aeronautics and Space Administration. This workshop had the purpose of bringing together the nation's experts in the solution of information systems problems, particularly those in which mechanization has made evident the need for precision and efficiency. Previous conferences and symposia have generally dealt with details of specific approaches to solutions in each of the problem areas involved in implementation, but no major symposium had dealt with the problem of how the information systems designer does his work.

CONTENTS: Introduction to Workshop, by R. M. Hayes. Review of the Methodology, by C. P. Bourne. Determining User Requirements, by H. Borko. Determination of User Needs, by S. Herner. Getting to Know the User, by J. Becker. Summary of the Panel Discussion on Meeting Operational Requirements, by J. Morison.

Behavioral Factors in Information Systems, by J. Postley. The Designer's Tools, by D. V. Black. Criteria for the Organs of Information Systems, by R. A. Fairthorne. A System for Systems Design, by Claire K. Schultz. Automatic Analysis and Synthesis, by G. Arnovick. Equipment Specifications, by H. P. Luhn.

HOWARD

ELECTRONIC INFORMATION DISPLAY SYSTEMS

Edited by JAMES H. HOWARD, *Rear Admiral, U.S.N. (ret.), Research Associate*, under the Auspices of the Center for Technology and Administration, The American University, Washington, D.C. 390 pages, 6 x 9, illus. (1963) . . . \$9.75

Reports on the state-of-the-art in the development and application of electronic information display systems. Specifically, this book treats displays as information-handling techniques and devices for command and decision-making. The material presented in the 20 chapters is for the most part adapted from oral presentations made by the various authors at the Institute for Electronic Information Display Systems presented by the Center for Technology and Administration of the American University in May, 1962. Additional papers have been included where appropriate.

CONTENTS: System Concept and Human Factors in Information Display, by Burton R. Wolin. Display System Design, by R. T. Loewe. Data Transmission for Display Purposes, by W. B. Quirk. Determination of Requirements, by Raymond Šabeb. Preparing for Installation of an Information Display System, by Maj. Lionel Alderman, USAF. Physical Principles of Displays, by Harvey G. Talmadge, Jr. Cathode-ray Tubes, by Frances R. Darne. Photochromic Dynamic Display, by E. J. Haley. Display Applications of Electroluminescence, by M. S. Wasserman. Display Requirements and Techniques for Air Traffic Control, by Walter N. Pike. Alphanumeric Symbolology Generation for TV Scan-

Converted Displays, by G. E. Fenimore. Application of the Direct-view Storage Tube to Video Tracking and Display, by James Fox. Applications of Display Systems at Goddard Space Flight Center, by Jack Cohen. Management Control Data Display Systems, by H. J. Heglin et al. ANIP Display Concepts, by Lt. Cdr. Richard N. de Callies, USN. Submarine Ship Control Displays, by Lt. Cdr. T. F. Davis, USN. ARTOC Displays, by R. T. Loewe. Computer-generated Displays in Management-Control Systems, by Robert W. Asher and R. P. Kenny. Electronic Information Display Systems in the Chemical Industry, by W. A. Crawford. Man-computer Information Transfer, by Sidney L. Smith.

INFORMATION PROCESSING

HOWERTON

INFORMATION HANDLING—FIRST PRINCIPLES

Edited by PAUL W. HOWERTON, *Vice President, Information for Industry, Inc.*
207 pages, 6 x 9, illus. (1963) \$6.00

A primer to which information-processing workers can turn for a comprehensive, synoptic view of the elementals of information handling—people who have responsibility for decisions which would regulate the operations of their organizations by controlling its information flow, or information center operators who have come from the ranks of “bench scientists” and lack experience in documentation work. The authors of each chapter had but one specification given them—to express their ideas so that the beginner can be instructed, but also that the veteran documentalist may find stimulation to adapt these fundamentals to solve new problems.

CONTENTS: Information System Theory as the Foundation of Practical Design, by David C. Weeks, Communication Sciences Division, Information for Industry, Inc. File Organization: Principles and Practices for Processing and Maintaining the Collection, by Pauline Atherton, American Institute of Physics. Indexing in Depth: Practical Parameters, by John C. Costello, Jr., Battelle Memorial Institute. Optimizing Information Searches, by John L. Garland, International Business Machines Corporation. Feedback from the User: Sine Qua Non,

by Wayne Campbell, U.S. Patent Office. The Role of the Information System Executive, by Terence G. Jackson, Jr., Stanford Research Institute. Organization for a Science Information Service, by Lowell H. Hattery, Director, Center for Technology and Administration, the American University. Selection and Training of Information Center Personnel, by John Sherrod, Chief, Science and Technology Division, the Library of Congress. Criteria for Total Information System Evaluation, by Paul W. Howerton.

HOWERTON-WEEKS

VISTAS IN INFORMATION HANDLING

Edited by PAUL W. HOWERTON, *Vice President, Information for Industry, Inc.*, and DAVID C. WEEKS, *Assistant General Manager, Communication Sciences Division, Information for Industry, Inc.* 233 pages, 6 x 9, illus. (1963) . . . \$7.50

Subtitled “The Augmentation of Man’s Intellect by Machine,” the purpose of this volume is to provide a forum for discussion of advanced thinking on the various frontiers of twentieth-century communication, including such areas as associative memory, models for the structural analysis of natural language, and the empirical results of language data processing. Also included is the subject of literature processing in a discipline (chemistry), including solutions to problems inherent in Japanese scientific and technical literature.

CONTENTS: A Conceptual Framework for the Augmentation of Man’s Intellect, by Douglas C. Englebart. Linear Associative Information Retrieval, by Vincent E. Giuliano and Paul E. Jones. Dimensioning in an Associative Memory, by Benjamin F. Cheydleur. Structural Models for Linguistic Automation, by Wilfred P. Lehmann and Eugene Pendergraft. Automatic Translation and Language Data Processing, by Léon E. Dostert. Homographs: Their Classification and Identifi-

cation, by Milos Pacak. Problems of the Chemical Literature and Some Solutions, by Herman Skolnik. Problems Inherent in the Handling of Scientific and Technical Information in Japan, by Toshikazu Takayanagi. The Production of Critical Scientific Data, by Robert J. Howerton. Toward Integration of Engineering Data Processing and Automatization of Design, by Börje Langefors.

ICIREPAT

COMMITTEE FOR INTERNATIONAL COOPERATION IN INFORMATION RETRIEVAL AMONG EXAMINING PATENT OFFICES—THIRD ANNUAL MEETING, Vienna, 1963

Edited by H. PFEFFER. Proceedings of the Third Annual Meeting, Vienna, 1963.
6 x 9, illus. (ready September, 1964)

Thirty-nine papers on progress and developments in information processing as applied specifically to patent offices around the world, including such topics as indexing, abstracting and classification; storage and retrieval systems, and the planning, testing, and evaluation of information-processing systems. Among the countries represented are Australia, Canada, Denmark, Germany, Japan, Netherlands, Norway, Sweden, United Kingdom, United States, and the U.S.S.R.

PEDELTY

AN APPROACH TO MACHINE INTELLIGENCE

By MICHAEL J. PEDELTY, *Research Scientist, Adaptronics, Inc.* 125 pages, 6 x 9, illus. (1963)..... \$6.50

This book provides a fundamental treatment of the problem of intelligent action, whether human or mechanical. It places special emphasis on the limitations imposed by the communication channels to and from the environment. The intelligent machine is viewed as a regulator of some dynamic process, to be controlled within the limits imposed by a goal structure. The way in which a machine may modify its goal structure is also treated. The emphasis is on principles rather than specific devices, but the section on neuromimes gives the main characteristics of some of the more common artificial "neurons," contrasted with the real thing.

CONTENTS: Introduction. Orientation. Properties of an Intelligent Machine. Deductive Systems and the Predicate Calculus. Goals and Goal Manipulating Mechanisms. Machine-Environment Interaction. The Information Interface. The Level of Awareness. Importance of Intelligent Machine Design. Synopsis of Basic Concepts. Cybernetic Principles of Stability and Control. The Observation Channel. Information Theory and the Observation Channel. The Action Channel. The Concept of Parameterization. Some Properties the Real Neuron.

Synopsis of Neuromimes for Logic Devices. Probability State Variable Devices and Other Sophisticated Building Blocks. Organization in the Time Domain. Circuits. Synthesis of Reliable Circuits from Unreliable Components. Appendix: Set Theory. Lattice Theory. Partitions. Ordered Sets and Lattices. Definitions. A Condition to Insure That Two Ideals Have No Point s in Common Other Than $s = \phi$. The Selection of Identifiers. Physical and Functional Realizability. Noise. Need for Inhibition.

POLLOCK-KOESTER-TIPPETT

OPTICAL PROCESSING OF INFORMATION

Edited by DONALD K. POLLOCK, *Office of Naval Research*, CHARLES J. KOESTER, *American Optical Company*, and JAMES T. TIPPETT, *Department of Defense*. 286 pages, 6 x 9, illus. (1963)..... \$7.50

This volume comprises the Proceedings of the Symposium on Optical Processing of Information cosponsored by the Information Systems Branch of the Office of Naval Research and the American Optical Company, October 23-24, 1962, in Washington, D.C. The purpose of the symposium was to bring together research workers in the fields of optics and information processing in order to promote information exchange and to focus further attention on the new techniques being developed. Papers on optical physics, memory and logic functions, lasers, fiber optics, modulation, and demodulation are here presented, with numerous halftone illustrations and line drawings.

CONTENTS: Parallel Organized Optical Computers, by Herbert M. Teager. Optical Filtering by Double Diffraction, by André Maréchal. Elementary Derivation of Wave Shape and Coherence Properties of Natural Light, Using the Tools of Communication Theory, by Stanford Goldman. Storage and Logic in an Optical Digital Computer, by Lewis C. Clapp. Some Properties of Fiber Optics and Lasers, Part A, by Elias Snitzer. Some Properties of Fiber Optics and Lasers, Part B, by Charles J. Koester. Information Retrieval from Phase-modulating Media, by H. M. A. El-Sum. The Problem of Light-Beam Deflection at High Frequencies, by Uwe J. Schmidt. Theory and Application of Single-sideband Suppressed-carrier Optical Modulation, by V. J. Fowler et al. Light-induced Processes in Cuprous Oxide, by Nicolaos

A. Economou. Visual Information Processing in the Beetle Lixus, by James C. Bliss. Linear Discrimination Optical-electronic Implementation Techniques, by T. R. Babcock et al. Component Evaluation for an Optical Data Processor, by Robert J. Potter. Vibrating Optic Fibers—a New Concept for Audio-Frequency Information Processing and Pattern Recognition, by Robert D. Hawkins. Broadband Demodulators for Microwave-modulated Light, by B. J. McMurty and A. E. Siegman. Considerations in Optoelectronic Logic and Memory Arrays, by T. E. Bray. A Natural Image Computer, by J. K. Hawkins and C. J. Munsey. A High-speed, Large-capacity Fixed Store for a Digital Computer, by G. R. Hoffman and D. C. Jeffreys. Feasibility of Neuristor Laser Computers, by Walter F. Kosonocky.

ROSENBLATT

PRINCIPLES OF NEURODYNAMICS: Perceptrons and the Theory of Brain Mechanisms

By FRANK ROSENBLATT, *Cornell University*. 616 pages, 6¼ x 8¼, illus. (1962) \$6.50

This famous work, already a classic in its field, was originally published in a limited quantity as a technical report for distribution by the Informations Systems Branch of the Office of Naval Research and Cornell Aeronautical Laboratory, Inc. In response to an overwhelming demand, Spartan has republished this technical report without any modification. Dr. Rosenblatt sets forth the principles, motivations, and accomplishments of perception theory in their entirety, together with a complete mathematical exposition of the perceptron or brain-model concept—originally intended as a generic name for a variety of theoretical nerve sets. Outlined also is the difference in motivation between the perceptron program and the various engineering projects concerned with automatic pattern recognition, artificial intelligence, and advanced computers.

CONTENTS (abridged): Physiological and Psychological Considerations. Basic Definitions and Concepts. Three-Layer Series-Coupled Perceptrons. The Existence and Attainability of Solutions in Elementary Perceptrons. Q-Functions and Bias Ratios in Elementary Perceptrons. Performance of Elementary α -Perceptrons in Psychological Experiments. Elementary Perceptrons with Limited Values. Perceptrons with Multiple R-Units.

Three-Layer Systems with Variable S-A Connections. Multi-layer and Cross-coupled Perceptrons. Four-layer Perceptrons with Adaptive Preterminal Networks. Open-loop, Cross-coupled Systems. Q-Functions for Cross-coupled Perceptrons. Adaptive Processes in Closed-loop Cross-coupled Perceptrons. Perceptrons with Cross-coupled S and R-Systems. Back-coupled Perceptrons and Problems for Future Study.

SCHWARTZ

PRINCIPLES OF CODING, FILTERING, AND INFORMATION THEORY (see page 21)

TATE

ADVANCES IN MICROFILM TECHNOLOGY

Edited by VERNON D. TATE, *National Microfilm Association*. 360 pages, 5¾ x 8¾, illus. (1962) \$9.00

Presents the Proceedings of the National Microfilm Association's 11th Annual Meeting held in Washington, D.C., April 25–27, 1962, comprising 30 papers on such topics as document storage systems, command retrieval information systems, company survival plans, role of microfilm in teaching machines, magnetic indexing, mapping applications, microforms, and library copying of books and documents. Profusely illustrated with line drawings and photographs.

CONTENTS (abridged): The Threshold to Tomorrow. The case for Realism in Document Storage Systems. "Walnut" Document Storage and Retrieval System. "Cris" The Command Retrieval Information System. Rapid Random Access for Information Retrieval. Microfilm and Company Survival Plan. New Techniques for Microfilm Exposure Control. The Impact of Magazine Film Use in the Microfilm Industry. The Total Systems Concepts Concept. A Line Density Standard to Replace Background Density. Microfilm in the International Market. The High Production Manufacture of Duplicate Microfilm—A Means, Not an End. The Role of Microfilm in the Teaching Field. A Future Microsystem for the U.S. Patent Office. The Role of Electrophotography in the Complete Miniaturization System. A Management

View of Microfilm. "FOSDIC" Microfilm Problems and Their Solutions. Magnetic Indexing, Microfilm Storage and Information Retrieval. The Rapid Selector and Other NBS Document Retrieval Studies. Applications Micro-xerographic Techniques to Information Recording. Microfilming in Mapping Application. Photochromic Micro-images: A key to Practical Microdocument Storage and Dissemination. Publishing in the Microform. Library Handling of Microforms. The Design of Improved Microimage Readers for Promoting the Utilization of Microimages. The Economics of "On Demand" Library Copying. The Second Edition of the Guide to Micro-production Equipment. Why Do We Need a Glossary of Microfilm Terms?

TECHNICAL INFORMATION CENTER ADMINISTRATION

(see page 13)

TOU-WILCOX

COMPUTER AND INFORMATION SCIENCES

Edited by JULIUS T. TOU, *Director, Computer Sciences Laboratory, The Technological Institute, Northwestern University*, and RICHARD H. WILCOX, *Head, Information Systems Branch, Office of Naval Research*. 512 pages, 6 x 9, illus. (1964)..... \$12.00

Computer and information science, a relatively young field, is rapidly becoming an important subject. This field of scientific study covers a great variety of extremely significant topics, such as advanced automatic programming, artificial intelligence and neurocybernetics, automata theory and sequential machines, computer organization and control, decision theory, information retrieval, language translation, learning and cognitive systems, modern applications of digital computers to solve complex military, industrial, government, and business problems. Computer and information science may be regarded as *the science of extending man's intellect*.

In similar fashion, this volume, giving the full text of the papers presented at the 1963 COINS Symposium held at the Northwestern Technological Institute in Evanston, Illinois, on June 17-18, covers a great variety of topics, ranging from dynamic programming to automata theory, from pattern recognition to learning control, from perceptron theory to artificial intelligence, from adaptive logic to feature detection. This "extension of the intellect" will be felt by many readers as a welcome antidote to the ever-growing specialization of technical fields.

This pioneering volume has been edited with the primary purpose of providing a ready source of reference material in new areas of science for the widest possible audience, so that the day of physical realization of intelligent machines may be brought nearer.

CONTENTS: Keynote Address—The Next Ten Years, by W. R. Ashby. A Model for Experimental Storage in Neural Networks, by F. Rosenblatt. On Some Fundamental Theorems of Perceptron Theory and Their Geometry, by A. Charnes. Determination and Detection of Features in Patterns, by H. D. Block, N. J. Nilsson, and R. O. Duda. Hyperplanes, Hyperspheres, and Hyperquadrics as Decision Boundaries, by P. W. Cooper. A Mathematical Approach to Pattern Recognition and Self-organization, by D. B. Brick and J. Owen. A Practical Application of Adaptive Linear Decision Functions, by J. S. Griffin, Jr., J. H. King, and C. J. Tunis. A Theoretical and Experimental Study of a Model for Pattern Recognition, by L. A. Kamentsky and C. N. Liu. New Developments in Artificial Intelligence and Pattern Recognition, by A. Gamba. The Structure of the Semi-group Associated with Automata, by C. P.

Weeg. Temporally Organized Automata and an Algebraic Theory of Machines, by M. J. Pedelty. An Adaptive Template Pattern Recognizer, by S. Kiaczko-Ryndziun. Pattern-recognizing Control Systems, by B. Widrow and F. W. Smith. Learning Control Systems, by K. S. Fu. A Problem Solver with Formal Descriptive Inputs, by D. J. Kuck and G. K. Krulec. Dynamic Programming, Learning, and Adaptive Processes, by R. Bellman. Prerequisites of Self-organization, by A. M. Andrew. A New Approach to Learning and Information Theory, by M. D. Mesarovic. New Problems in Adaptive Control, by P. H. Greene. Thousand-gate Computer Simulation of a Billion-gate Computer, by R. S. Ledley. Natural and Artificial Intelligence, by L. Fein. Principles of Learning-system Construction for Complex Processes Control, by A. G. Ivakhnenko. On the Design of a Learning System for Control, by V. I. Ivanenko and J. T. Tou.

WILCOX-MANN

REDUNDANCY TECHNIQUES FOR COMPUTER SYSTEMS

(see page 11)

YOVITS-JACOBI-GOLDSTEIN

SELF-ORGANIZING SYSTEMS—1962

Edited by MARSHALL C. YOVITS, *Office of Naval Research*, GEORGE T. JACOBI, *Armour Research Foundation*, and GORDON D. GOLDSTEIN, *Office of Naval Research*. 563 pages, 6 x 9, illus. (1962)..... \$12.00

This volume presents 26 papers comprising the Proceedings of the Conference on Self-Organizing Systems held in May, 1962, at Chicago, sponsored by the Informations Systems Branch of the Office of Naval Research and the Armour Research Foundation of the Illinois Institute of Technology. The papers in general tend to show that the goal of the successful creation of useful artificial self-organizing systems is coming closer to realization. Self-organizing systems, which have been variously defined as systems that change their structure in response to changes in the inputs, or in an attempt to achieve or pursue certain goals, are described in mathematical terms and illustrated in a variety of models.

CONTENTS: The Organization of Organization, by O. G. Selfridge. On Self-organizational Systems, by Mihajlo D. Mesarovic. Self-organization in the Time Domain by, D. M. Mackay. Neurological Models and Integrative Processes, by Warren S. McCulloch, Michael A. Arbib, and Jack D. Cowan. Information Input Overload, by James G. Miller. Inter-Nation Simulation: An Example of a Self-organizing System, by Harold Guetzkow. Optimization Through Evolution and Recombination, by H. J. Bremermann. On the Automatic Formation of a Computer Program Which Represents a Theory, by Saul Amarel. Natural and Artificial Synapses, by Leon D. Marmon. Logical Aspects of Neuristor Systems, by H. D. Crane. On Probabilistic Push-Down Storages, by M. P. Schützenberger. Concerning Efficient Adaptive Systems, by John H. Holland. Empirical Laws and Physical Theories; The Respective Roles of Information and Imagination, by L. Brillouin. Majority Logic and Problems of Probabilistic Behavior, by Saburo Muroga. Interaction Between a Group of Subjects and

an Adaptive Automation to Produce a Self-organizing System for Decision-making, by Gordon Pask. Cybernetic Ontology and Transjunctional Operations, by Gotthard Günther. Some Problems of Basic Organization in Problem-solving Programs, by Allen Newell. Training Sequences for Mechanized Induction, by R. J. Solomonoff. Generalization and Information Storage in Networks of Adaline "Neurons," by Bernard Widrow. A Comparison of Several Perceptron Models, by Frank Rosenblatt. A New Class of Multilayer Series-coupled Perceptrons, by Alan G. Konheim. A Test for Linear Separability as Applied to Self-organizing Machines, by Richard C. Singleton. Function Algebra and Propositional Calculus, by Karl Menger. A Feedback Coding Theory of Learning and Cognition, by Harold H. Kantner. Some Similarities Between the Behavior of a Neural Network Model and Electrophysiological Experiments, by Belmont G. Farley. On the Representation of Information by Neural Net Models, by Peter H. Greene.

BREGMAN

SURFACE EFFECTS IN DETECTION (see page 7)

GOLDBERG-VACCARO

PHYSICS OF FAILURE IN ELECTRONICS

Edited by M. E. GOLDBERG, *Armour Research Foundation of Illinois Institute Of Technology*, and JOSEPH VACCARO, *Rome Air Development Center, U.S.A.F.* 256 pages, 6 x 9, illus. (1964)..... \$7.50

This timely summary presents the Proceedings of the Symposium on the Physics of Failure in Electronics held in September, 1962. The objectives of the symposium were to bring together research workers concerned with the determination and enhancement of electronic part and device reliability so as to evaluate recent progress, consider future directions of research, and exchange information among a number of related disciplines—reliability engineering, physics, metallurgy, and mathematics.

CONTENTS: Reliability and the Physics of Failure Program at RADC. Physics of Resistor Failure. Primary Modes of Failure Occurring at Material Interfaces in Thin-film Solid-state Devices. Nonlinear Mechanisms and Stress Concentrations. Anomalous Radiation Damage Effect on Capacitance of Silicon Diodes. Project Control. Fundamental Failure Mechanism Studies. Diagnostic Techniques in Semiconductor-device Stress-Response Analysis. Effects of High-energy Radiation on Failure Mechanisms in Semiconductor Devices. Characteristics of "Second Breakdown" and Transistor

Failure. Failure Physics and Reliability Engineering. Failure Concepts and Modern Reliability Theory. Dislocations and Semiconductor-device Failure. Effect of Gam Ambient on the Failure of Traveling-wave Tubes. Omegatron Investigation of Gases Evolved from Components of TWT's Under Operating Conditions. Reliability Physics. Thermal Instabilities and Hot Spots in Junction Transistors. Current Noise Measurement. Tunnel-diode Failure. Dielectric Degradation in Perovskites. Electrical Detection of Surface Effects in Transistors.

KRAUS

EXTENDED SURFACES (see page 7)

MURNAGHAN

APPLIED MATHEMATICS FOR ENGINEERS AND SCIENTISTS

(see page 5)

SCHWARTZ

PRINCIPLES OF CODING, FILTERING, AND INFORMATION THEORY

By LEONARD S. SCHWARTZ, *New York University*. 225 pages, 6 x 9, illus. (1963)..... \$8.50

The essential ideas and techniques applied to achieve communication over a noisy channel are presented in this new text and reference work. The author discusses the possibilities and limitations of coding, filtering, detection of signals in noise, and communication feedback. The basic principles of these areas are lucidly presented at a level which makes the book a suitable text for senior-year undergraduate and graduate level engineering students. The material of the text has been used by Professor Schwartz in his course in Information Theory and Filtering and Prediction Theory at New York University. For scientists and engineers whose major interest is in different areas, and for all who are interested in this vital field with its ramified implications in many different areas—ranging from semantics to psychology, from biology to cryptography, this valuable book will serve as a comprehensive introduction and broad-scale survey.

CONTENTS: Introduction. Properties of Statistical Information. Discrete Noisy Channels. Maximum Reliable Information Rate. Coding as a Means for Achieving Near-maximum-reliable Information Rate. Continuous

information Systems. Generalized Harmonic Analysis. Applications of Generalized Harmonic Analysis to Linear Filtering. Detection of Signals in Noise. Communication Feedback Systems.

SELIG-ETTELSTEIN

NEW HORIZONS IN INDUSTRIAL ENGINEERING

Edited by SEYMOUR M. SELIG, *Office of Naval Research, U.S. Navy*, and MORTON ETTTELSTEIN, *Personnel Research Activity, U.S. Navy*. 232 pages, 5½ x 8¾, illus. (1963)..... \$7.50

Presenting the papers read at the November, 1962 symposium conducted by the American Institute of Industrial Engineers in Washington, D.C., this volume provides up-to-the-minute, detailed information on the frontier regions in industrial engineering, with particular emphasis on PERT (Program Evaluation and Review Technique, PERT COST, CPM (Critical Path Method) , PACE (Performance and Cost Evaluation program) , and the general problem of work measurement from the managerial, economic, and sociological viewpoints.

CONTENTS: CPM—Present and Future, by James E. Kelley, Jr. The PERT COST System, by J. Ronald Fox. Implementation of PERT COST, by Richard E. Matthews. Case Study: PERT COST Implementation, by Alan S. Hays. History of CPM Training, by John W. Mauchly. Making Sense with CPM, by Herbert Berman. CPM Applications in Air Force Civil Engineering Projects, by Col. George J. Anzelon, USAF. Simulation—A Tool for Industrial Engineers, by James W. Larsen. PACE—Performance and Cost Evaluation Program, by Howard U. Feldman. The Future of Work Measurement,

by Bertram Gottlieb. The Future of Work Measurement as Seen from an Economic Viewpoint, by C. L. M. Kerkoven. Commentary on the Future of Work Measurement, by Robert H. Roy. Management's Problem in a Dynamic World, by Alfred E. Perlman. The Engineer in Foreign Lands, by John Fayerweather. The Engineer and the Underdeveloped Areas, by Frederick G. Draper. The Management Factor in Development, by Robert R. Nathan. New Management Tools in the U.S. General Services Administration, by Bernard L. Boutin.

SOCIAL SCIENCES

BORNET

LABOR POLITICS IN A DEMOCRATIC REPUBLIC

By VAUGHN DAVIS BORNET, *Professor of History and Chairman, Division of Social Sciences, Southern Oregon College*. 6 x 9, illus. (1964)..... \$6.95

Subtitled "Moderation, Division, and Disruption in the Presidential Election of 1928," this timely social study of the political spectrum of the roaring 'Twenties is that rare combination of a scholarly work and an engrossing human document. In these pages appear such leading figures of the times as Herbert Hoover, Al Smith, Norman Thomas, and William Z. Foster, together with labor leaders of the old A. F. of L. and the various railroad brotherhoods. The efforts of the Socialists and Communists to build a labor party are documented in detail, and the disruptive effects of the issues of Catholicism and prohibition are clearly set forth.

CONTENTS (abridged): Unions In a Prosperous America. The Path of Traditional Labor Politics. Jockeying for Party Position. The Socialists Organize for Struggle. The Communists Organize for Battle. Labor Leaders in Conventional Cities. Hoover Appeals to the Laboring Men. Smith Appeals to Union Organizations.

Thomas Appeals to "Workers" and "Progressives." Foster Appeals to the "Proletariat." The Pattern of Labor's Party Allegiance. The American People Decide. The Backwash of a Presidential Election. Labor Politics in a Democratic Republic.

BOVET

THE DYNAMICS OF BUSINESS MOTIVATION

By ERIC D. BOVET. 357 pages, 6 x 9 (1963)..... \$8.75

This highly original study of the problems of business cycles, depressions, market saturation, and cyclical or increasing unemployment does more than merely offer a sound new theory of their causation but, in approximately equal proportion, sets forth in detail the author's proposed remedy for these economic ills. According to the author, motivational analysis shows that in a modern industrial economy most businessmen's profit rates are most of the time distorted. When distorted profit rates are maximized, they cause conflicting speeds in the flow of goods from the mines and fields to retail markets; the supply fails to meet the demand with the desired accuracy, consumer purchasing power is wasted, and prices fluctuate wildly. "Business incentive coordination" is the author's name for the proposed remedy, which includes "Vertical Integration," "Production to Order," "Production for Replacement," and other natural or synthetic techniques.

CONTENTS (abridged): The Problem of Economic Integration. How Business Incentives Are Determined. How Conflicting Incentives Breed Stagnation and Instability. Price and Value Theory. The Law of Business Motivation. Unemployment Theory. Business Cycle

Theory. Business Incentive. Coordination: Possible Approaches. Vertical Integration. Production to Order. Production for Replacement. Synthetic Techniques. Auxiliary Techniques. Case Studies. Bibliographies.

WALTERS

RESEARCH MANAGEMENT Principles and Practices

By J. E. WALTERS, *Professor and Director, Engineering Administration Program, The George Washington University*. 350 pages, 6 x 9, illus. (ready October, 1964)

A detailed, illustrated guide to the efficient management of industrial and scientific research and development work, based on firsthand, in-person interviews in such leading R&D companies and institutions as E. I. du Pont de Nemours & Company, Lockheed Aircraft Corporation, General Motors Corporation, General Dynamics Corporation, Thompson-Ramo-Wooldridge, the Battelle Memorial Institute, Shell Development Corporation, and many more, backed by verbatim transcripts of R&D policy statements, programs, evaluation techniques, etc. Over 100 drawings, charts, and tables present a storehouse of facts, ideas, methods, and techniques in R&D management and organization. Emphasis is placed on the importance of psychological and personality factors in the successful operation of an R&D department, with much insight into the nature of creativity and imagination and how these qualities can be nourished in an organization.

CONTENTS (abridged): The Meaning of Research and Development and Its Management. The Status of Research and Development in the United States. The Purposes of Research and Development and Its Management. Scientific Method of Approach in the Management of Research and Development. Projects and Progress Formulation in Research and Development. Organization of Research and Development. Leadership, Creativity, and Human Relations. Human Relations and The

Motivation of Leading. The Performance of Research and Development. Administration in Research and Development Management. Coordination and Evaluation of Research and Development. Management Audit of Research and Development. Summary of Research Management. Varian Associates; Basic Objectives and General Policies. Major Research and Development Goals. Examples of Position Descriptions in Research and Development.

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